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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/728,210	12/04/2003	David Herbert Roach	CL2248USNA	7968

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WILMINGTON, DE 19805

EXAMINER

ASHTON, ROSEMARY E

ART UNIT	PAPER NUMBER
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1752

DATE MAILED: 05/19/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

10/728,210

Applicant(s)

ROACH ET AL.

Examiner

Rosemary E. Ashton

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 16 February 2006.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-8, 13-24 and 41-81 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☒ Claim(s) 67-81 is/are allowed.
- 6) ☒ Claim(s) 1-5, 8, 13-17, 19, 41, 43-49, 52-55 and 59-64 is/are rejected.
- 7) ☒ Claim(s) 6, 7, 18, 20-24, 42, 50, 51, 57, 58, 65 and 66 is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 04 December 2003 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
 - ☐ Certified copies of the priority documents have been received in Application No. _____.
 - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

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DETAILED ACTION

1. The indication of allowability of claim 8 in the prior office action because the examiner applies a new ground of rejection over new claim 41 which includes the subject matter of claim 8. This office action **is not final**.

Claim Rejections - 35 USC § 103

2. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

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4. Claims 1-5,8,13-17,19,41,43-49,52-55/~~56~~59-64 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hattori et al US 2002/0094483 in view of website article, Carbon nanotubes in the citation in Wikipedia (the free encyclopedia), (en.wikipedia.org/wiki/Carbon_nanotube) with the article in Physicsweb cited as support for stating carbon nanotubes are known in the art.

In section 53, shown below, Hattori teaches a positive photoresist composition comprising nanoparticles and a binder. The nanoparticles are listed in section 25 and include carbon black, graphite, C₆₀, aluminum oxide, gold and silver, also shown below, as in claims 53-56.

[0053] Furthermore, a material for forming a shade pattern used for a photomask manufacturing method of the present invention is characterized by containing at

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least nanoparticles and a binder. In this case, the binder is used to form a film by connecting the nanoparticles to each other, and polymer or organic compounds are generally used as the binder. In the case of manufacturing of the photomask of the present invention, a shade pattern is formed by actinic irradiation. **Therefore, it is preferable that the binder used for the present invention is made of a material having photo-sensitivity to the radiation, which is a resist material. Therefore, a material, in which nanoparticles are dispersed in a resist material using polymer or organic materials, may be used.** In this case, the term "dispersed" means such a state that fine particles float in a resist solution. To prevent fine particles from settling, floating or becoming un-uniform in a dispersed state, it is preferable to add a dispersant for helping dispersion as occasion demands. **The resist material has a positive type one in which an exposed portion is removed through development, and a negative type one in which an unexposed portion is removed through development.** Either of them may be used as occasion demands. Because the nanoparticles used in this case are also the same as those above described, the description thereof will be omitted.

[0025] Moreover, the above nanoparticles have each diameter of several .mu.m order or less, and preferably of [fraction (1/10)] the minimum working dimension, and, in this case, of 200 nm or less, and are ones that can scatter light, that is, means ones that can irregularly reflect light. Therefore, a flat metallic sheet made of chromium or the like having a smooth or rough face is not included. Moreover, nanoparticles each have, for example, light refractive index different from a binder. The photomask of the present invention functions as a photomask for preventing transmission of light because nanoparticles contained in the shade pattern scatter light. Fine particles of inorganic matter are used as nanoparticles contained in the shade pattern according to the present invention. **Specifically, it is also possible to use fine particles of carbon such as carbon black, graphite or C.sub.60, or fine particles of metal oxide such as titanium oxide, aluminum oxide, zinc oxide or the like, or fine particles of a metal such as aluminum, gold, silver, copper or the like.** The above particle diameter of 200nm is the maximum value. That is, diameters of nanoparticles contained in a pattern are distributed over the maximum value.

Hattori does not teach the nanoparticles are carbon nanotubes. *as in claim 41.*

It is known in the art that there are different structural forms of pure carbon which include graphite, diamond and C₆₀, known as fullerene or buckyballs. It is also known that carbon nanotubes are known in the art (Physicsweb, January 1998) are a "member of the fullerene structural family which also includes buckyballs" (page 1/10 in the citation in Wikipedia).

It would have been obvious to one of ordinary skill in the art to use a carbon nanotube as the nanoparticle in the invention of Hattori with a reasonable expectation of obtaining a shade pattern because Hattori teaches C₆₀ (fullerene) may be used as the nanoparticle in the invention and carbon nanotubes are a member of the fullerene structural family (page 1/10 in the citation in Wikipedia).

Resist II prepared in example 2, shown below, has a t-butyl acrylate monomer that meets the limitations of formula III in claims 1 and 34 when R9 and R10 are methyl groups and R11 is a hydrogen atom. It also is the sixth monomer in claims 13 and 44. The resist also has PGMEA as a solvent.

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PREPARATION EXAMPLE 2

[0115] A resist (II) is prepared in which carbon having a solid content concentration of 14% is dispersed by adding PGMEA used as a solvent, to 12 g of poly (p-hydroxystyrene-co-t-butylacrylate (molar ratio=52/48), 0.6 g of naphthylimide triflate, and 50 g of carbon black dispersion (carbon-black particle diameter of about 20 nm and content of 17 wt %) obtained by using a solvent as propyleneglycolmethylether acetate (PGMEA).

Section 128 teaches the photoresist is a film. The examples show the particles have a dimension in nanometers (20 nm or 30 nm) which is much less than the particle size of 100 or 10 microns.

The examiner notes the claims reading on the amount of particles in the composition claim the amount in units of vol % whereas Hattori teaches the amount in solid content concentration. Thus, it is not known if the amount of particles in the composition is the same as claimed, however, it would have been obvious to one of ordinary skill in the art to vary the amount of particles in the composition so as to form a successful shade pattern because variation in the amount of reagents in order to obtain the "best" result of the invention is a standard and well known method in the art.

As to claims 52-58, 59-64, independent claim 52 reads on the polymer having an acid labile monomer of a THP (me)acrylate which is the first monomer ⁵⁶ _{listed,} Hattori does not teach the polymer has this monomer, however, resist II has the acid labile monomer t-butyl acrylate, thus it would have been obvious to one of ordinary skill in the art to use THP (me)acrylate rather than t-butyl acrylate with a reasonable expectation of obtaining a successful photoresist composition because THP (me)acrylate is a well known acid labile monomer in the art and thus an obvious alternative to a t-butyl acrylate acid labile monomer.

Allowable Subject Matter

5. Claims 6,7,18,20-24,42,50,51,57,58,65,66 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

6. The following is a statement of reasons for the indication of allowable subject matter: The prior art does not anticipate or render obvious the polymer in claim 42, the specific particles in claims 6,7, 57 and 58, the paste in claim 18 or the film in claims 20-24,50,51,65 and 66.

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7. Claims 67-81 are allowed.

8. The following is an examiner's statement of reasons for allowance: The prior art does not teach a lighting device or vacuum electronic device with an electron field emitting film having the claimed positive particulate photoresist composition.

Any comments considered necessary by applicant must be submitted no later than the payment of the issue fee and, to avoid processing delays, should preferably accompany the issue fee. Such submissions should be clearly labeled "Comments on Statement of Reasons for Allowance."

9. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Rosemary E. Ashton whose telephone number is 571-272-1326. The examiner can normally be reached on Mon-Fri, 11:00-5:00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Cynthia Kelly can be reached on 571-272-1526. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).



Rosemary E. Ashton
Primary Examiner
Art Unit 1752

May 7, 2006

**ROSEMARY ASHTON
PRIMARY EXAMINER**